

Measurement of salivary Immunoglobulin A of participants with a healthy, gingivitis and chronic periodontitis conditions

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ABSTRACT

Background: Secretory Immunoglobulin A (sIgA) is a subclass of Immunoglobulin A (IgA), It is an antibody that plays an important role in mucosal immunity. It is the main immunoglobulin found in mucous secretions from mammary glands, tear glands and salivary glands, every pathologic process in the body involves the immune system, and periodontal inflammation is one of them and is not an exception.

Material and methods: this study was consisted of 60 healthy male participants of an age ranged between (35-50) years old ; 25 of them with generalized moderate chronic periodontitis(Clinical Attachment Loss equal to 3-4mm at \geq 30% of the sites; 20 participants with plaque induced gingivitis and 15 participants had clinically healthy periodontium as control group. oral examination include Plaque Index, Gingival Index, Probing Pocket Depth and Clinical Attachment Level were conducted for all participants four sites were examined for each tooth (labial ,lingual, mesial and distal), 2ml of unstimulated whole saliva was collected from all participants to measure Secretory Immunoglobulin A in $\mu\text{g/ml}$ by Enzyme-linked immunosorbent assay technique.

Results: salivary IgA(sIgA) mean was (356.3) $\mu\text{g/ml}$ for the chronic periodontitis patients; while it was 202 $\mu\text{g/ml}$ for plaque induced gingivitis patients and it was 129.2 $\mu\text{g/ml}$ for the control group. Highly significant differences among the three group were recorded (P-value <0.001). For chronic periodontitis patients, the Plaque Index Gingival Index scores were positively highly significant correlated with Secretory Immunoglobulin A level in saliva. The Probing Pocket Depth scores were positively and significantly associated with Secretory Immunoglobulin A level. The Clinical Attachment Level scores were positively but non significant associated with Secretory Immunoglobulin A level. For the gingivitis and the control group they were positive non significant association between the periodontal parameters and the Secretory Immunoglobulin A level in saliva.

Conclusion: there is a correlation between Secretory Immunoglobulin A level in saliva and the periodontal health status.

Keywords: sIgA, saliva, chronic periodontitis, gingivitis. (J Bagh Coll Dentistry 2015; 27(3):120-123).

INTRODUCTION

Periodontal diseases (PD) are multi-factorial diseases that involved hard and soft dental tissues, Bacterial colonization, and immune responses of the host. Antibodies of the humoral immune responses have an important role in protection of the oral environment because of the ability of antibodies to prevent microbial attachment to cell surfaces and aggregation of microorganisms ⁽¹⁾. Specific antibody systems, including immunoglobulin A (IgA), are found in saliva.

Saliva sample cannot give site specific information but it considered as a complex body fluid now a day used for early diagnosis and detection markers for potential vulnerability to several diseases including periodontal disease^{2,3} whole saliva analysis give us a simple and non-invasive method for evaluating the role of salivary IgA (sIgA) levels in Periodontal disease ^(4,5). Periodontal inflammation like other pathologic process in the body involves the immune system. a wide number of microorganisms play an important role in periodontal disease.

They may cause destruction by 1. Microbial metabolites that cause direct inflammatory responses; and 2. By antigen or oral microbes starting immunopathologic processes causing periodontal inflammation ^(6,7).

Salivary IgA(sIgA) is considered as the first line of defense in the oral cavity against the invading microorganisms and it is shown to be a predominant immunoglobulin in external secretion against IgG, which predominates in serum and internal secretion ^(8,9).

This study was used unstimulated whole saliva for analysis of sIgA and search if there is a correlation between sIgA concentration and different periodontal parameters for patient with chronic periodontitis, plaque induced gingivitis and healthy control

MATERIALS AND METHODS

Study design

This study was conducted in Baghdad College in the department of periodontics. Sixty adult males, with an age ranged between 35-50years old groups were involved. They should be healthy with no history of any systemic disease, non-smoker not received any antibiotic therapy in the previous one month .Patients suffering from systemic diseases and those with upper respiratory

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diseases were excluded. Samples were grouped as:

1. Group 1(G1): 25 participants with generalized moderate chronic periodontitis (CAL=3-4mm at \geq 30% of the sites)⁽¹⁰⁾
2. Group 2 (G2): 20 participants with plaque induced gingivitis
3. Group 3(G3): 15 participants as the control group with no clinical sign of gingival or periodontal inflammation

Collection of saliva

Between the hours of 10-12a.m. and One hour after the last meals, Two to three ml.s of unstimulated whole saliva was collected before the clinical periodontal examination. Each participant was asked to rinse his mouth with water to remove any debris present. The first mouth full of saliva was discarded to ensure water clearance then they were asked to spit all the saliva in sterile test tube over a fifteen minutes period.

The samples of saliva were centrifuged at 3000 r.p.m for 15 minutes to remove the debris and then the superior clear supernatant saliva kept frozen at -20 until biochemical assessment. Salivary Immunoglobulin A (sIgA) concentration was evaluated using Enzyme Linked immunosorbent Assay (ELIZA) technique for the quantitative determination of secretory IgA following the guide lines of the commercial kit provided by Demeditec Diagnostics GmbH.D-24145Kiel (Germany). The ELIZA test was done in Biochemistry department of blood bank in Bab-

Almuatham. Data analyses were conducted by using of SPSS (Version 15).

Clinical examination

Periodontal examination included Plaque Index⁽¹¹⁾, Gingival Index⁽¹²⁾, Probing Pocket depth (PPD)⁽¹³⁾ and Clinical attachment level (CAL)⁽¹⁴⁾.

RESULTS

Table (1) was shown Mean and standard deviation of the periodontal parameters (PLI, GI , PPD, CAL) of chronic periodontitis , PLI and GI for gingivitis and control groups. Table 2 was shown mean and standard deviation of sIgA for the G1 it was (356 μ g/ml \pm 103.9), for G2 it was (202 μ g/ml \pm 43.05) and G3 it was (129 μ g/ml \pm 64.91). The F-test was used and showed highly significant differences among the three groups.

Table(3) showed inter group comparison for IgA with significant differences using t-test highly significant differences were found between each pair of groups (P<0.001) Table (4)showed the correlation between sIgA and the periodontal parameters of the three groups for G1 group PLI and GI positively and highly significant correlation was found(+0.571),(+0.71) respectably, for PPD positive significant correlation was found (+0.450), while it was positive but non significant correlation for the CAL(+0.104), for the other two groups there was positive but non significant correlation between sIgA and the periodontal parameters.

Table 1: Mean and Standard deviation for the periodontal parameters of the three groups

Variables	Chronic Periodontitis		Gingivitis		Control	
	Mean	SD	Mean	SD	Mean	SD
PLI	1.82	0.50	1.67	0.41	0.82	0.24
GI	1.99	0.37	1.77	0.38	0.66	0.34
PPD	5.10	0.98	-	-	-	-
CAL	3.7	0.89	0	0	0	0

Table 2: Mean and Standard deviation with significant differences for the SIgA of the three group using F-test

SIgA μ g/ml	Chronic periodontitis		Gingivitis		Control		F- test	P-value
	Mean	SD	Mean	SD	Mean	SD		
	356.3	103.9	202	43.05	129.2	64.91	44.01	0.000***

*P value >0.05 non significant, ** P value <0.05 significant, *** P value <0.001 Highly significant

Table 3: Inter group comparison for IgA level with significant differences using t –test

Groups	t- test	p- value
Control & gingivitis	0.000165	<0.001***
Control & chronic periodontitis	0.00063	<0.001***
Gingivitis & chronic periodontitis	0.00051	<0.001***

Table 4: Correlation coefficient between the periodontal parameters of the three groups and sIgA level ($\mu\text{g/ml}$)

Variables	Chronic periodontitis (sIgA) (356) $\mu\text{g/ml}$		Gingivitis (sIgA) (202) $\mu\text{g/ml}$		Control (sIgA) 129.2 $\mu\text{g/ml}$	
	r	P-value	r	p-value	r	p-value
PLI	+0.571	0.0008***	+0.323	0.08*	+0.256	0.28*
GI	+0.71	0.000***	+0.312	0.09*	+0.109	0.67*
PPD	+0.450	0.04**	-	-	-	-
CAL	+0.104	0.5*	-	-	-	-

DISCUSSION

sIgA considered as the main immunoglobulin isotype in body secretions including saliva and it is considered to be the principal line of defense of the host against pathogens⁽¹⁵⁾.

Salivary IgA prevents the mucosal penetration and considered as first line of defense. Antibacterial activity of sIgA is due to its property of coating and agglutinating of microorganism. The agglutinating mechanism is explained by the fact that antibodies in the saliva will react with bacteria proliferating on surface and prevent their attachment⁽¹⁶⁾.

The present study was included healthy male only to avoid the alteration in salivary flow rate between male and female⁽¹⁷⁾, we take unstimulated saliva because stimulation led to decrease in salivary IgA concentration^(18,19). Patients selected for the study of an age ranged between 35-50 as Challacombe et al⁽²⁰⁾ and Miletic et al⁽²¹⁾ those authors were found a significant reduction in the concentration and secretion rates of salivary IgA in the elderly people. In the present study the level of sIgA in gingivitis and periodontitis patients were found to be highly significant when compared with the healthy controls group, this study was in agreement with many studies^(16,22-25).

The higher levels of sIgA in chronic periodontitis and gingivitis group due to production of IgA from the immunocytes of salivary glands, gingival tissue, and from serum due to antigenic stimulation by periodontopathogenic bacteria. For G1 there is direct and strong relation between sIgA and PLI scores and GI scores, for G2 and G3 there were also a direct relation with sIgA level and it is easy to explained when there is more microbial plaque biofilm on the teeth mean more microbial toxin that cause direct gingival inflammation also more microbial antigen that illicit the immune system for production of more sIgA, Butchibabu et al study⁽²⁴⁾ improved That the level of sIgA will decrease after phase 1 of periodontal treatment. We concluded the more

severe the periodontal involvement the more level of s IgA level as it is the first line of host defense.

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الخلاصة: ان الاجسام المضادة المفترزة من نوع أ هي احد انواع الاجسام المضادة المهمة للمناعة وهي تلعب دور حيوي ومهم في مناعة وحفظ الاغشية المخاطية وهو يوجد بوفرة في الافرازات المخاطية لغدد الدمع والغدد اللعابية والغدد اللبينية وهو ذا اهمية في العمليات التي تتطلب جهاز المناعة والتهابات الانسجة المحيطة بالاسنان ليست بمعزل عنها. الدراسة تمثلت بجمع عينات من اللعاب لمرضى النساغ المزمن ومجموعة من من المصابين بالتهاب اللثة البسيط ومجموعة ضابطة وتم قياس الجسم المضاد نوع (أ) نتائج هذا البحث اظهرت ارتفاعا ملحوظا في تركيز الجسم المضاد (أ) لمجموعة مرضى النساغ المزمن وان هناك فرقا معنويا كبير عند مقارنة المجموع الثلاث.